

Remarks

Upon entry of the foregoing amendment, claims 1-12 and 15-17 are pending in the application, with claims 1, 10, 12, and 15 being the independent claims. Claims 1, 10, 12, and 15 are sought to be amended by the foregoing amendment. These changes are believed to be fully supported by the specification and are not believed to introduce new matter. Thus, it is respectfully requested that the amendments and additions be entered by the Examiner. Based on the following remarks, Applicant respectfully requests that the Examiner reconsider all outstanding rejections, and that they be withdrawn.

Rejections under 35 U.S.C. § 103

In the current Office Action, claims 1-4, 6-10, 12 and 17 are rejected under 35 § U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,423,396 to Makimoto *et al.* (hereinafter "Makimoto") in view of U.S. Patent No. 6,108,569 to Shen (hereinafter "Shen"). Applicants respectfully traverse based on the following remarks.

Claims 1 and 10 have been amended so that *said first, second, and third portions of the bypass line have a substantially constant trace width*. FIG. 3A illustrates an example of this feature where the trace width of bypass line portions 308, 312, and 318 are all substantially constant. Therefore, the bypass line input and the bypass line output are formed from sections of the bypass line that have the same trace width as the remaining third portion of the bypass line.

In contrast, referring to FIG. 10 of Makimoto, the elements 908 and 909 are mere electrode connections to the transmission line 910 and are not meant to be part of the transmission line 910. This is apparent from FIG. 10 of Makimoto, where the connections nodes have a different width than the transmission line 910, and by the text of Shen which refers to electrodes 808 and 809 as connections to the transmission line 910. (*See*, Makimoto, col. 5, lines 61-68, note that "electrodes 808 and 809" are assumed to be typos that should be "electrodes "908 and 909", respectively.) Accordingly, the mentioned features of the *first, second, and third portions of the bypass line having a substantially*

constant trace width is not taught or suggested by Makimoto. Furthermore, neither Shen, nor any of the other cited art cures this defect. Accordingly, Applicants request that the rejection under 35 § U.S.C. 103(a) be removed, and that claims 1 and 10 and their respective dependent claims be passed to allowance. Claims 12 and 15 and their respective dependent claims are also allowable for at least the same reasons.

Conclusion

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicants believe that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

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Amendments to the Claims

This listing of claims will replace all prior versions, and listings of claims in the application.

Claim 1 (currently amended): A bandpass filter, comprising:

a plurality of spiral resonators that are electromagnetically coupled to each other, each spiral resonator having a terminal coupled to a ground;

a bypass line in parallel with said plurality of spiral resonators, said bypass line having a bypass line input coupled to a first spiral resonator of said plurality of resonators and a bypass line output coupled to a second spiral resonator of said plurality of resonators;

an input, coupled to said first spiral resonator; and

an output, coupled to said second spiral resonator;

said bypass line input formed from an outer segment of said first spiral resonator that is in-parallel with a first portion of said bypass line, said bypass line output formed from an outer segment of said second spiral resonator that is arranged in-parallel with a second portion of said bypass line, a third portion of said bypass line coupled between said first portion and said second portion, wherein said first, second, and third portions of said bypass line have a substantially constant trace width.

Claim 2 (previously presented): The bandpass filter of claim 1, wherein said spiral resonators are quarter wavelength transmission lines.

Claim 3 (previously presented): The bandpass filter of claim 2, wherein said quarter wavelength transmission lines are microstrip transmission lines.

Claim 4 (previously presented): The bandpass filter of claim 1, further comprising:
an input capacitor coupled between said input and said first spiral resonator; and
an output capacitor coupled between said output and said second spiral resonator.

Claim 5 (original): The bandpass filter of claim 4, wherein said input capacitor and said output capacitor are printed finger capacitors.

Claim 6 (previously presented): The bandpass filter of claim 4, further comprising:
a bypass line input coupler, coupled between said bypass line and said first spiral resonator; and
a bypass line output coupler, coupled between said bypass line and said second spiral resonator.

Claim 7 (previously presented): The bandpass filter of claim 6, wherein said plurality of spiral resonators includes a third spiral resonator coupled between said first spiral resonator and said second spiral resonator.

Claim 8 (previously presented): The bandpass filter of claim 7, further comprising:
a substrate, wherein said plurality of spiral resonators, said bypass line, said input capacitor, said output capacitor, said bypass line input coupler, and said bypass line output coupler are printed on said substrate.

Claim 9 (original): The bandpass filter of claim 1, wherein an input impedance and an output impedance are a desired value.

Claim 10 (currently amended): A bandpass filter comprising:

- an input coupled to an input capacitor;
- an output coupled to an output capacitor;
- a first spiral resonator coupled to a ground, said input capacitor, a first intercoupler and a bypass line input coupler;
- a second spiral resonator coupled to said ground, a second intercoupler, a bypass line output coupler, and said output capacitor;
- a third spiral resonator coupled to said ground, said first intercoupler, and said second intercoupler, wherein said first spiral resonator, said second spiral resonator and said third spiral resonator are electromagnetically coupled quarter wavelength transmission lines;
- a bypass line coupled between said bypass line input coupler and said bypass line output coupler, wherein said bypass line causes improved image channel signal rejection at said output; and
- a substrate, wherein said first spiral resonator, said second spiral resonator, said third spiral resonator, said bypass line, said input capacitor, said output capacitor, said bypass line input coupler, and said bypass line output coupler are printed on said substrate;
- said bypass line input coupler formed from an outer segment of said first spiral resonator that is in-parallel with a first portion of said bypass line, said bypass line output coupler formed from an outer segment of said second spiral resonator that is arranged in-parallel with a second portion of said bypass line, a third portion of said bypass line coupled between said first portion and said second portion, wherein said first, second, and third portions of said bypass line have a substantially constant trace width.

Claim 11 (original): The bandpass filter of claim 10, wherein said input capacitor and said output capacitor are printed finger capacitors.

Claim 12 (currently amended): A differential bandpass filter, comprising:

a plurality of spiral resonators that are electromagnetically coupled to each other, each spiral resonator having a terminal coupled to a ground;

a first bypass line, in parallel with said plurality of spiral resonators, said bypass line having a bypass line input coupled to a first spiral resonator and a bypass line output coupled to a second spiral resonator;

a first input, coupled to said first spiral resonator;

a first output, coupled to said second spiral resonator;

a second plurality of spiral resonators that are electromagnetically coupled to each other, each spiral resonator having a terminal coupled to said ground;

a second bypass line, in parallel with said second plurality of spiral resonators, said second bypass line having a second bypass line input coupled to a third spiral resonator and a second bypass line output coupled to a fourth spiral resonator;

a second input, coupled to said third spiral resonator; and

a second output coupled to said fourth spiral resonator;

said first bypass line input formed from an outer segment of said first spiral resonator that is in-parallel with a first portion of said first bypass line, said first bypass line output formed from an outer segment of said second spiral resonator that is arranged in-parallel with a second portion of said first bypass line, a third portion of said first bypass line coupled between said first portion and said second portion of said first bypass line, wherein said first, second, and third portions of said first bypass line have a substantially constant first trace width;

said second bypass line input formed from an outer segment of said ~~first~~ third spiral resonator that is in-parallel with a first portion of said ~~second~~ bypass line, said second bypass line output formed from an outer segment of said ~~second~~ fourth spiral resonator that is arranged in-parallel with a second portion of said second bypass line, a third portion of said second bypass line coupled between said first portion and said second portion of said second bypass line, wherein said first, second, and third portions of said second bypass line have a substantially constant second trace width; and

said first input and said second input forming a differential input capable of receiving a differential signal, said first output and said second output forming a differential output capable of producing a differential signal.

Claim 13 (canceled)

Claim 14 (canceled)

Claim 15 (currently amended): A double conversion tuner, comprising:

- a tuner input;
- a first variable gain amplifier, coupled to said tuner input;
- a first mixer coupled to a first local oscillator and said first variable gain amplifier;
- a printed bandpass filter, coupled between said first mixer and a second mixer, including
 - a plurality of spiral resonators that are electromagnetically coupled to each other, each spiral resonator having a terminal coupled to a ground;
 - a bypass line, in parallel with said plurality of spiral resonators, said bypass line having a bypass line input coupled to a first spiral resonator and a bypass line output coupled to a second spiral resonator;
 - said bypass line input formed from an outer segment of said first spiral resonator that is in-parallel with a first portion of said bypass line, said bypass line output formed from an outer segment of said second spiral resonator that is arranged in-parallel with a second portion of said bypass line, a third portion of said bypass line coupled between said first portion and said second portion of said bypass line, wherein said first, second, and third portions of said bypass line have a substantially constant trace width;
 - a bandpass filter input, coupled to an output of said first mixer; and
 - a bandpass filter output coupled to an input of said second mixer;
 - a second local oscillator, coupled to said second mixer;

a second IF bandpass filter coupled to said second mixer and a second variable gain amplifier; and

a tuner output, coupled to said second variable gain amplifier.

Claim 16 (original): The double conversion tuner of claim 15, wherein said printed bandpass filter is a differential bandpass filter.

Claim 17 (previously presented): The bandpass filter of claim 7, further comprising:

a first intercoupler that weakly couples said first spiral resonator to said third spiral resonator; and

a second intercoupler that weakly couples said third spiral resonator to said second spiral resonator.